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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/731,745	12/08/2003	Peidong Yang	UC03-118-3	5099

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JOHN P. O'BANION
O'BANION & RITCHEY LLP
400 CAPITOL MALL SUITE 1550
SACRAMENTO, CA 95814

EXAMINER

ANDERSON, MATTHEW A

ART UNIT PAPER NUMBER

1722

DATE MAILED: 05/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/731,745

Applicant(s)

YANG ET AL.

Examiner

Matthew A. Anderson

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) ____ is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 13-22 is/are allowed.
- 6) ☒ Claim(s) 1-3, 6, 7, 9-12, 23 and 25-29 is/are rejected.
- 7) ☒ Claim(s) 4, 5, 8, 24 and 30-35 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Oath/Declaration

1. The oath or declaration filed on 5/17/2004 has been noted and entered.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3, 6-7, 9-11, 23, 25-26 are rejected under 35 U.S.C. 102(b) as being anticipated by Hoffman (US 5,352,512).

Hoffman discloses methods of making tubes of 5 nanometer (nm) or greater diameter. The wall thickness is about 1 nm or more. The material of the tube can be polymer, ceramics, metals. These tubes are formed on fibers of carbon, glass, or other fibers. (see abstract) In col. 1 line 55-60, these materials include silica, carbon, carbides, oxides, nitrides. Oxides or high temperature oxides are the preferred materials for the tubes (col. 2 lines 15-20). Others are given in col. 2 lines 50-67 as ferrous metal, non-ferrous metal, boride, semiconductors, and diamond. The fibers are fixed in a preform configuration and held rigidly in that configuration. (col. 2 and col. 3) Then the fibers are cleaned and then coated. Then, the fibers are removed by gas phase or liquid phase etching. The tube material is not destroyed by the techniques used to remove the fiber. The fibers are described as carbon or graphite in col. 4 lines

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65+ and as quartz or polymer in col. 5 lines 1-10. In col. 5, the coating of the nanotubes is suggested. Thermal oxidation is disclosed in col. 6 lines 50-65.

Thus, the method of forming a nanotube (i.e. a tube of nano-size) by deposition of a material over a nano-wire (i.e. a nano-sized fiber) and then removing (i.e. sacrificing) the nano-wire to form a nanotube (i.e. a longitudinal segment) comprised of the material is anticipated by Hoffman. Additionally, the nano-wire is used in Hoffman as a form for the nanotube and thus the nano-wire anticipates the use of a sacrificial template for the nanotube. Also, anticipated are carbon or graphite fibers (i.e. the group IV element carbon) and polymers used as the nano-wire material. Forming multiple layers (i.e. multiple longitudinal segments) by coating the nano-tubes is also disclosed. Forming the tube material by oxidation of the wire is also disclosed (col. 6 lines 50-65) and thus anticipated by Hoffman.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 12, 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoffman.

Hoffman is described above.

Hoffman does not specifically suggest arrays of nano-wires. Also, Hoffman does not specifically suggest Si as the nano-wire and Silicon Oxide as the nanotube material.

However, In respect to claim 12, it would have been obvious to one of ordinary skill in the art at the time of the present invention to form an array of nano-wires on a substrate because Hoffman suggests holding or fixing the core fiber in a desired shape and that one of those shapes would include aligned nano-tubes which allow gas flow only in one direction (col. 7 lines 25-30).

In respect to claim 27, it would have been obvious to one of ordinary skill in the art at the time of the present invention to form SiO_2 on Si by oxidizing the Si because the formation of oxide by such oxidation is disclosed in col. 6 lines 50-65 and one of ordinary skill in the art would have thus expected similar results with Si and SiO_2 .

In respect to claims 28-29, it would have been obvious to one of ordinary skill in the art at the time of the present invention to optimize the temperature of the thermal oxidation since such processing parameters were known and since the applicant has not claimed or given evidence that this parameter is critical to the results.

Allowable Subject Matter

6. Claims 4-5,8, 24, 30-35 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. Claims 13-22 are allowed.

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8. The following is a statement of reasons for the indication of allowable subject matter: The formation of nanotubes having a single crystal structure by using single crystal structured nano-wires as a template is not suggested by the closest prior art (Hoffman).

Additionally, in respect to claim 30, the closest prior art of Hoffman does not suggest covering the sheath and nano-wire with an etch-resistant material and then removing the top end of the sheathed nano-wire while the sheathed walls of said nanotube are protected.

9. The following is an examiner's statement of reasons for allowance:

In respect to claims 13-22, although oxides and nitrides were suggested as useable by Hoffman, there was no suggestion to use ZnO as the nano-wire and GaN as the nano-tube material. The use of these specific materials to form nanotubes in the manner claimed was not to be found in the prior art of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew A. Anderson whose telephone number is (571) 272-1459. The examiner can normally be reached on M-F, 8:30-5.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on (571) 272-1137. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MAA
May 23, 2005


BENJAMIN L. UTECH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700